

TWO NEW SPECIES OF THE *SIPHONOECETES* COMPLEX FROM THE ARABIAN GULF AND BORNEO (CRUSTACEA: AMPHIPODA)

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Abstract.—A new species, *Siphonoecetes arabicus*, is described from the Arabian Gulf, and a new species *B. wongi* is described in the new genus *Borneoecetes* from Borneo. The former species does not fit recently described subgenera, thus indicating a necessary reassessment of those taxa.

A new species of *Siphonoecetes* from the Arabian Gulf and a new species of *Borneoecetes*, new genus, from the shallow continental shelf off north Borneo are described.

The description of the Arabian species seems crucial at this time because of a massive oil spill in the Arabian Gulf in late 1982, a year after it was first collected by Dr. John C. McCain. Dr. McCain informed us that his survey of the benthos on the Arabian side of the Gulf near Dhahran showed this species to comprise nearly 30 percent of the total amphipod specimens in the sand biotope. This new species, *Siphonoecetes arabicus*, spins a tube from amphipod-silk, glues coarse grains, especially shell fragments, to the tube and simultaneously glues the tube to dead shells of bivalves or inside dead gastropod and bivalve mollusk shells, calcareous polychaete tubes, or into detached movable-finger crab claws, all of appropriate sizes. Owing to its small adult size, less than 3 mm in body length (smaller than 6 mm in body-antennae length), one assumes the competition for snail shells with hermit crabs is quite limited. Some of the variety of abodes selected by *S. arabicus* for gluing down its tubes are shown in Fig. 1. Although Harada (1971) found *S. tanabensis* able to drag its unfixed tubes around on the bottom by use of antenna 2, we initially judged that the heavy shells to which *S. arabicus* cements its tube would be too massive and too heavy to be moved by the very feeble appearing amphipod. However, Dr. J. Just of the Zoological Museum, University of Copenhagen, informs us that he has observed siphonoecetines able to drag very heavy loads and believes that most of the abodes we show in Fig. 1 could be moved by the amphipods.

Other species of *Siphonoecetes* are also known to inhabit shells of various sorts, for example, *Siphonoecetes pallidus* in *Dentalium* sp. (Sars 1895) in deep waters off Norway (100–300 m), *S. australis* also from *Dentalium* from Australia (Stebbing 1910), *S. conchicola* in *Olivella* sp. (Gurjanova 1951) from the Japan Sea, and *S. sabatieri* in snails of the genera *Bittium* and *Rissoa* (Chevreux and Fage 1925). But, apparently, some species always form simple silk tubes with agglutinated shell and mineral fragments, such as *S. colletti* (see Chevreux and Fage 1925). Several papers being published by Dr. Just give many more details of habitats of various species in the *Siphonoecetes* complex.

We follow the diagnostic method of Myers and McGrath (1979) who described *Siphonoecetes* from the British Isles and provided a key to the seven species of

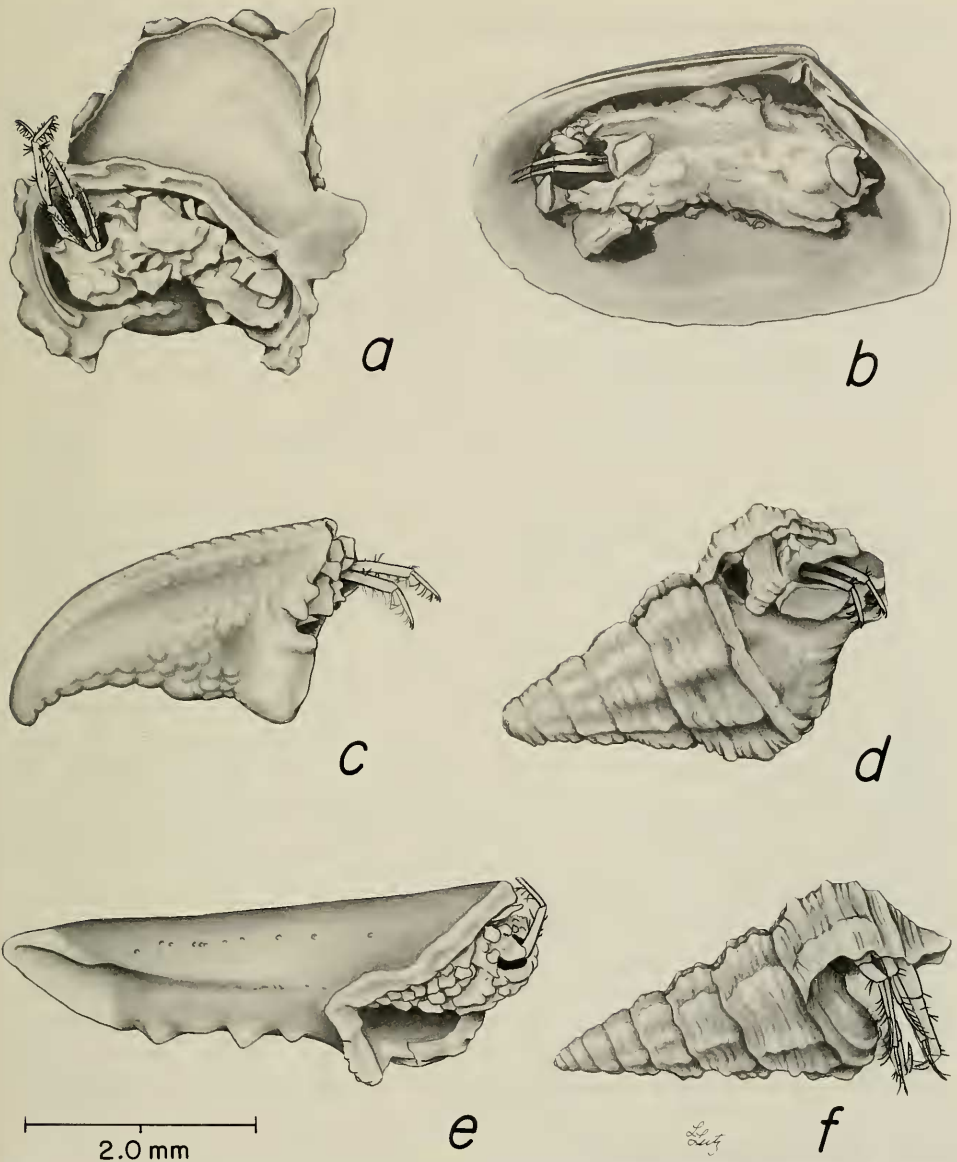


Fig. 1. Abodes of *Siphonoecetes arabicus*: a, Tube of amphipod silk and agglutinated shell fragments glued to bit of coral rubble; b, Same glued to bivalve; c, Same glued inside movable finger of crab claw; d, Same glued inside snail-shell; e, Same glued inside crab claw; f, Same glued inside similar snail-shell from different angle.

Europe. Because of the closeness of *Siphonoecetes* and *Borneoecetes* we use the same diagnostic method for *B. wongi*. Harada (1971) gave a key to all species of *Siphonoecetes* known at that time; we have therefore expanded the diagnoses from the Myers-McGrath format to include the characters used by Harada in his world treatment of the genus.

A paper by Just (1983) has been utilized in our work to classify these species

at generic level; his work may be consulted for extensive diagnoses and relationships of genera.

Explanation of Figure Legends.—Upper case letters in illustrations are explained in the following list; lower case letters to right of capital letters or in the body of an illustration are explained also in the following list; lower case letters to the left of capital letters are provided for subsidiary figures to note illustrated specimens listed in "Material." For each page of figures one main specimen is called "unattributed" and lacks letter designation. *A*, antenna; *B*, body; *C*, coxa; *F*, accessory flagellum; *G*, gnathopod; *H*, head; *J*, pleopod; *K*, spine or seta; *L*, labium; *M*, mandible; *O*, outer plate or ramus; *P*, pereopod; *R*, uropod; *S*, maxilliped; *T*, telson; *U*, labrum; *V*, palp; *W*, pleon; *X*, maxilla; *Y*, urosome; *Z*, oostegite. *d*, dorsal; *m*, medial; *r*, right; *s*, setae removed; *u*, unflattened.

Siphonoecetes arabicus, new species

Figs. 2-5

Diagnosis.—Size of adults about 2.25–2.80 mm. Body delicate, fragile, unpigmented in alcohol. Rostrum pointed, extending as far as ocular lobes, latter protuberant, quadrate. Eyes small. Antenna 1 barely exceeding apex of article 4 on antenna 2, flagellum with 5 well-developed articles tipped with tiny sixth. Articles 4 and 5 of peduncle on antenna 2 equal in length, flagellum with 4 articles, first two articles long and equal in juveniles, article 1 becoming slightly dominant in tropical adults, articles 3–4 vestigial, spines absent from article 1. Coxa 1 scarcely broader than long, anteroventral corner weakly and bluntly attenuate, all setae confined to small distance on margins. Gnathopod 1 with slender, unexpanded propodus (article 6) bearing 2–3 major posterior spines. Gnathopod 2 propodus ovate, palm sloping, equal to half of posterior margin, no extra spines present other than spine defining palm. Uropod 1 peduncle with about 4 dorsolateral setae evenly distributed, ventral apex extended as strongly serrate or fimbriate lamina. Uropod 1 rami unequal in length and thickness, inner shorter and thinner than outer, inner not swollen; outer ramus with dorsal spines, when present, evenly distributed, not mingling with apical spines. Uropod 2 peduncle apicoventral lamella strongly fimbriate; inner ramus more than 90 percent as long as outer ramus. Inner rami of uropods 1 and 2 each with 1 apical spine, apices of both rami with hollows bearing armaments. Uropod 3 peduncle with 2–3 apical spine-setae shorter than peduncle, ramus distinct, with 2–4 setae, middlemost (plumose) about twice as long as peduncle.

Description and Notes on Illustrations.—Most of morphology shown in illustrations; description largely based on holotype male. Eyes weak, formed of several irregular elements with scattered brownish pigment. Lateral and medial surfaces of peduncle on antenna 1 almost equally setose; accessory flagellum vestigial, composed of evanescent boss bearing 4 diverse setae. Lateral surfaces of peduncular articles on antenna 2 setose but lacking spines, medial surface of article 4 in both sexes with proximal to distal spine formula of 1-2, formula on article 3 in male = 1-2, in female = 0-1. Female antenna 2 relatively smaller than male but when adjusted to same magnification as in illustrations, articles 3–4 of peduncle of similar size, article 5 relatively longer in female, flagellum relatively

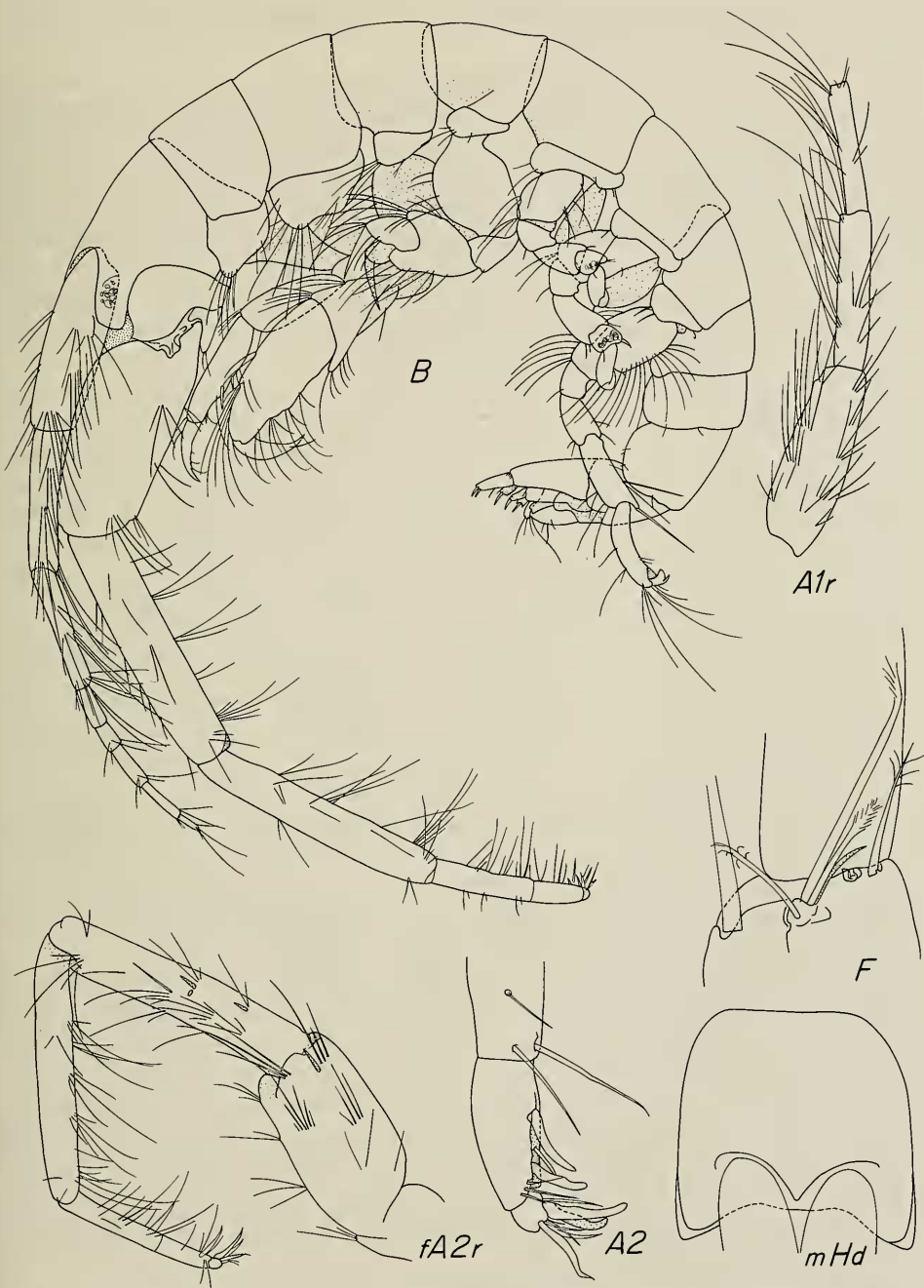


Fig. 2. *Siphonoecetes arabicus*, unattributed figures, holotype, male "a" 2.46 mm; f = female "f" 2.75 mm; m = male "m" 2.51 mm.

longer and thinner than in male; flagella with 4 articles; spinal differences slight (see illustrations).

Epistome unproduced; upper lip articulated to epistome, subcircular, weakly truncate or slightly excavate below. Mandibular incisors toothed, right and left laciniae mobiles with 2 and 3 teeth respectively, right and left rakers = 2 and 3, each molar with flake and seta, palp composed of one long article flared and bifid apically when properly flattened, notch bearing second tiny article tipped with seta. Labium as shown. Inner plate of maxilla 1 evanescent, outer plate with 7 spines (one hidden in illustration), medial pair bifid, palp ordinary. Inner plate of maxilla 2 with 3 medial setae, no facials. Inner plate of maxilliped with 2 main stubby apical spines, outer plate with sharp medial chisel-spines, palp article 4 small, stubby, bearing long nail and accessory nail.

Coxae all disjunct; coxa 1 of subadults generally with only 2 anterior setae and 6 on anteroventral corner (groups of 3-3 lateral and medial). Propodus (article 6) of gnathopod 1 in both sexes with tiny tooth apically representing palm, posterior margin with 2 spines, long in female, short in male. Gnathopod 2 without strong sexual distinction, lobe of carpus (article 5) with one stout spine, palm weak and defined by one stout spine, palm near hinge in female with cusp. Pereopods 3-4 alike, article 4 enveloping reduced article 5, article 6 attached to oblique apical margin of article 5, dactyl simple (bearing subapical meatus). Pereopods 5-6 subsimilar, small, article 5 with facial stridulating (or non-skid) surface, pereopod 7 elongate, lacking rough surfaces, dactyls of pereopods 5-7 with outer cusp. Large gills present on coxae 3-6 in male but in female gills 3-4 reduced greatly and gill 5 slightly reduced, thin oostegites present on coxae 2-5, formulae of anterior setae = 3-3-3-4, distal setae = 2-2-3-4, posterior setae = 2-2-2-3 (on female "f").

Epimera 1-3 each with midposterior seta in notch, epimeron 1 with 4 large ventral setae (one missing in illustration) and one posteroventral setule, epimeron 2 with 4 large ventral setae and 2 smaller posteroventral setae, epimeron 3 with 2 small ventral setae. Pleopods all subsimilar, each peduncle with medial lobe bearing 2 coupling hooks, formula of lateral peduncular setae on pleopods 1-3 = 3-2-2, outer rami all with 7 articles, formula of articles on inner rami = 7-7-6.

Urosomites 2 and 3 fused dorsally, urosome otherwise naked. Inner ramus of uropod 1 much smaller than outer ramus, dorsal minor spination of rami variable from side to side as shown. Uropod 2 as shown. Larger specimens and females generally with more setae on uropod 3 than male holotype, female "f" ramus with 5-6 setae, apex of peduncle with 5, medial peduncle with 1 seta; male "m" 2.51 mm with 4 apical setae on peduncle and 5 on ramus; female "k" 2.07 mm with 3 setae on peduncle apex and 3 on ramus. Plaques on telson with small corneal hooks (not well enough resolved in oil-immersion microscopy to illustrate). Female generally much more setose and spinose than male, especially on gnathopods.

Holotype.—USNM No. 195105, male "a," 2.46 mm.

Type-locality.—Arabian Gulf, off Manifa, 27°30'35"N, 49°00'15"E, Sta 1S1, 2-3 m, 21 Nov 1981, coll. Dr. J.C. McCain; fine medium grain sediments, near coral reef, 70°F, salinity 42‰.

Material and Distribution.—56 specimens from one station in the Gulf of Arabia, kindly supplied by Dr. John C. McCain of Tetra-Tech, Ltd., Dhahran, Saudi

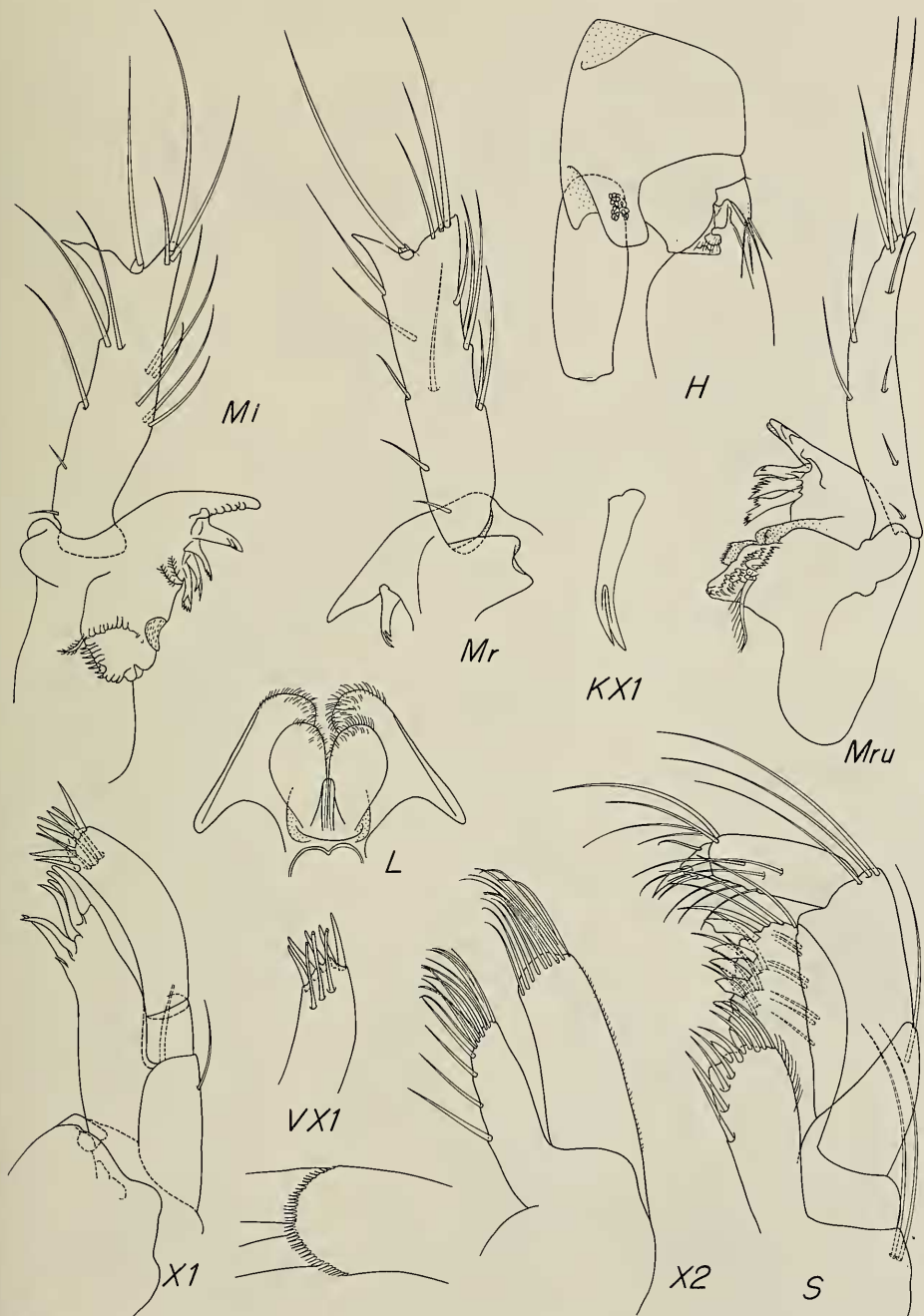


Fig. 3. *Siphonoecetes arabicus*, all figures, holotype, male "a" 2.46 mm.

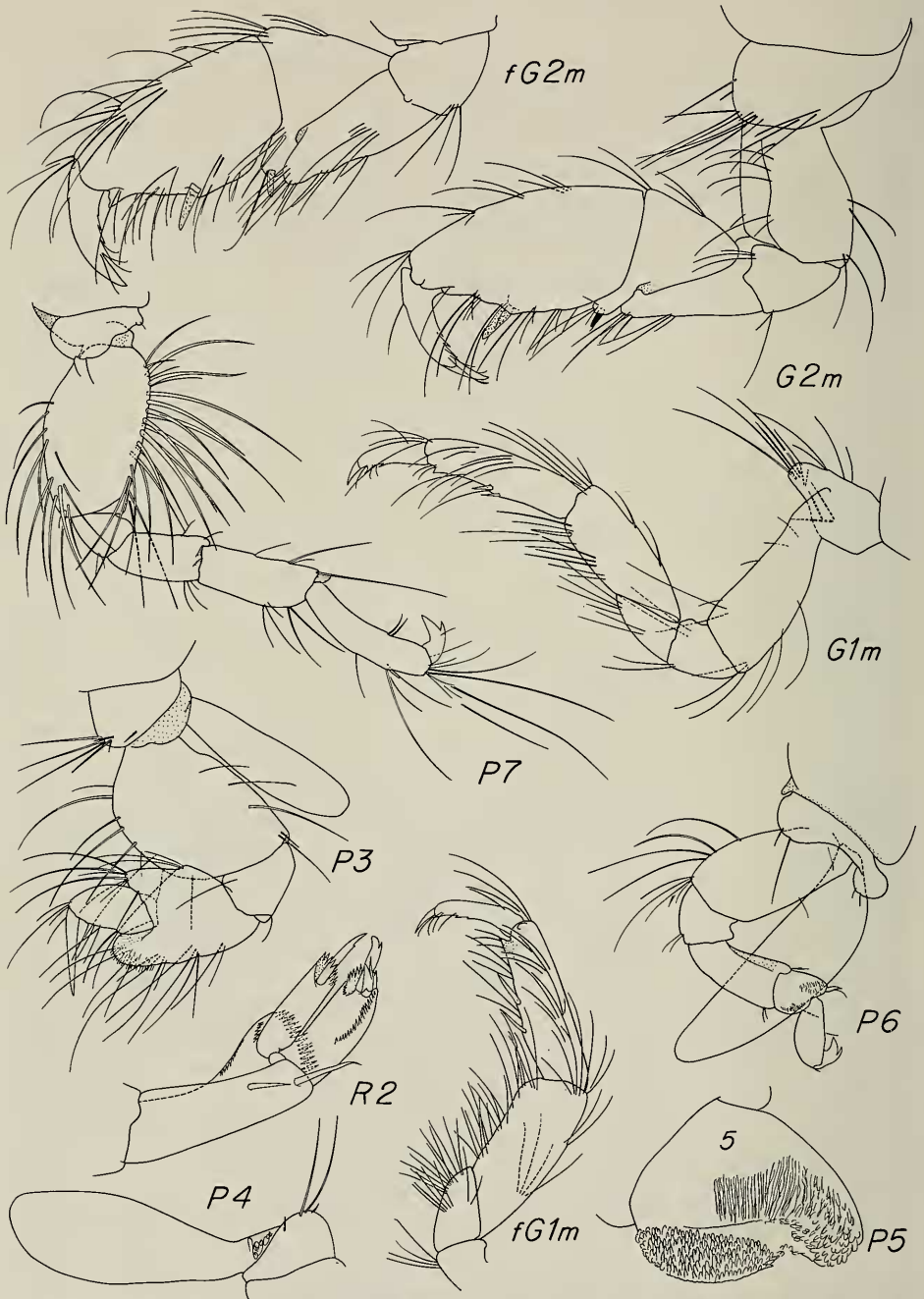


Fig. 4. *Siphonoecetes arabicus*, unattributed figures, holotype, male "a" 2.46 mm; f = female "f" 2.75 mm.

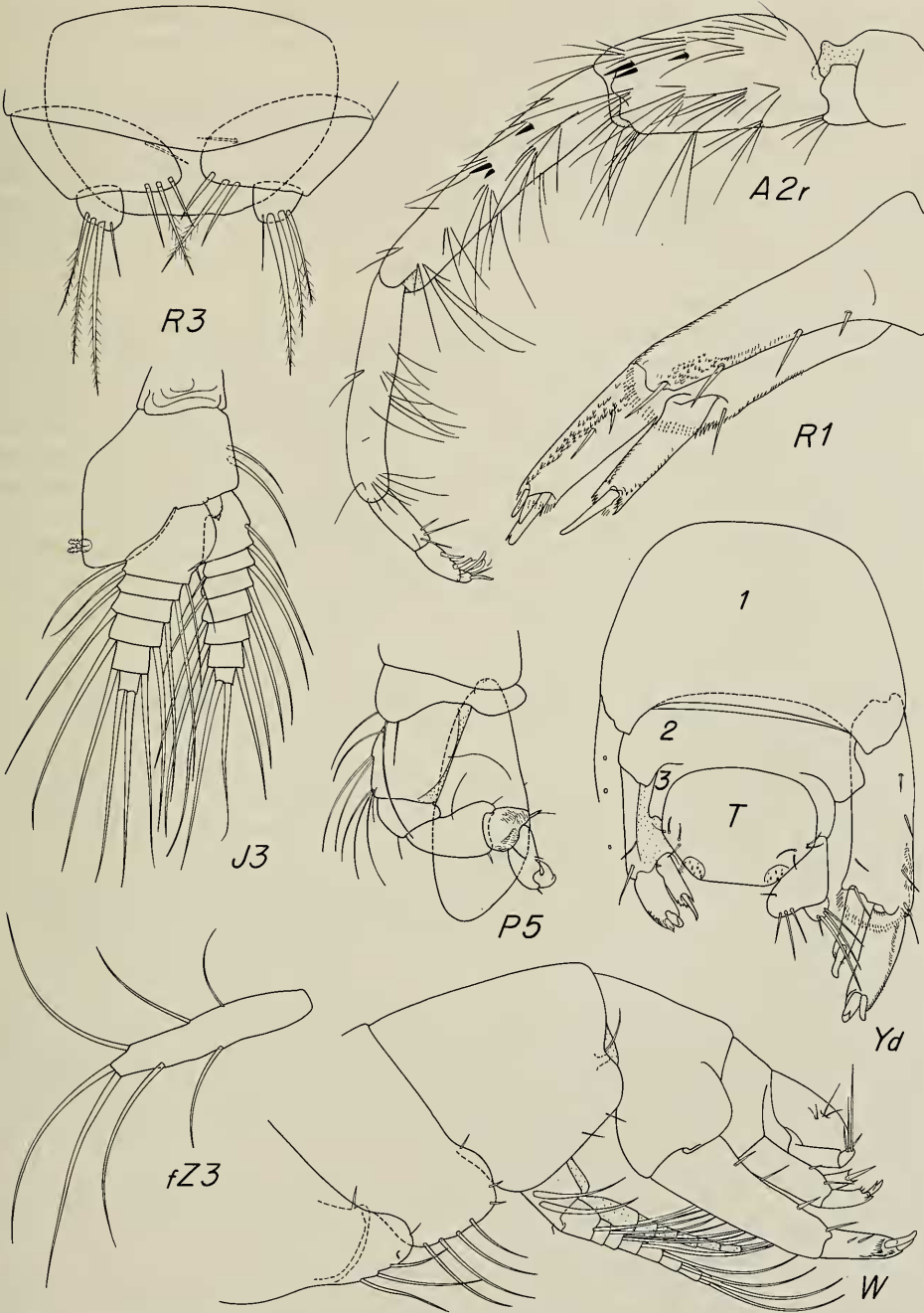


Fig. 5. *Siphonoecetes arabicus*, unattributed figures, holotype, male "a" 2.46 mm; f = female "f" 2.75 mm.

Arabia; male "d" 2.72 mm from crab claw; female "f" 2.75 mm (illustrated) from gastropod; female "k" 2.07 mm from crab claw; male "m" 2.51 mm (head illustrated) from gastropod.

Ecology.—Dr. McCain informs us that this species represents about 30 percent of the specimen count for amphipods in shallow waters along the shores of Saudi Arabia in the Arabian Gulf. The species builds a thin parchment tube of amphipod silk and attaches the tube inside the shells of *Dentalium* sp., *Caecum* sp., or other gastropods and often on the curved or flat surfaces of other shelled organisms such as pelecypods or the broken calcareous fragments of many other, unidentified shell-forming organisms.

Relationship.—This species does not fit precisely any of the subgenera described by Just (1983) as shown in the accompanying table. Four characters are used by Just to delineate those subgenera: (1) the presence or absence of spines on article 1 of the flagellum on antenna 2; (2) the normal ventral apex of uropod 1 bearing a straight comb as contrasted with a process; (3) the presence or absence of an apical hollow on the inner rami of uropods 1 and 2; (4) the presence of a strong row or essentially no row of apical setae on the peduncle of uropod 3.

Siphonoecetes arabicus: has only 1 spine on article 1 of the flagellum of antenna 2 and thus would barely be in the subgenus *Orienteocetes* but would remain very close to the other subgenera; has the normal uropod 1 and thus is not *Centraloecetes*; has the hollowed apex on the inner rami of uropods 1–2 and thus has affinities with the subgenus *Siphonoecetes* and not *Centraloecetes* nor *Orienteocetes*; has 3 apical setae on the peduncle of uropod 3 and thus lies in between any of the subgenera (Table 1).

By running this species through the key of Harada (1971) the similarities appear to be with *S. erythraeus* and *S. orientalis*, both of which belong to *Orienteocetes*. This species differs from *S. erythraeus* Ruffo (1959:20) from the Red Sea, in (1) the sharply bifid and splayed apex of the mandibular palp and the presence of a minute article 2 on the mandibular palp; (2) the denser setation of uropod 3 (7 setae versus 4); (3) the presence of only one (versus 2) apical spine on the inner ramus of uropod 2; (4) the much stouter and better developed hand of female gnathopod 2.

This species does not appear to be *S. orientalis* Walker (1904, pl. 7, fig. 49), from Ceylon, because gnathopod 2 of both sexes has a distinct palm and broader hand than illustrated by Walker. The flagellum of antenna 1 in *S. orientalis* has 14 articles. The spines on the flagellum of antenna 2 seem to be short, thick, evenly curved and regularly distributed.

Siphonoecetes australis Stebbing (1910), from Australia, has a broadened hand on gnathopod 1 and a strongly shortened and unornamented inner ramus on uropod 1. The rostrum is very blunt.

This species is very similar to *S. sabatieri* de Rouville (see Chevreux and Fage 1925:362) from the Mediterranean Sea, but differs in (1) the absence of thick spines mixed among the setae on the posterior margin of the hand on gnathopod 2; (2) the lack of one thick spine each on the peduncle and ramus of uropod 3; (3) the presence of only 1 (versus 2) apical spine on the inner ramus of uropod 1; (4) the different form of coxa 1 in which the plate is smaller, more quadrate, less attenuate and with the setae confined to less marginal length; many other characters of *S. sabatieri* are as yet poorly known.

All other species of *Siphonoecetes* have either a longer rostrum, no eyes, extra

Table 1.—Characters of subgenera in *Siphonoecetes*, compared to *Siphonoecetes arabicus*.

Character	<i>Siphonoecetes</i>	<i>Centraloecetes</i>	<i>S. arabicus</i>	<i>Orienteocetes</i>
Antenna 2 flagellum spines on article 1 (male)	0	0	0	+
Uropod 1 normal	+	0	+	+
Uropod 2 inner ramus with hollowed apex	+	0	+	0
Uropod 3 apical setae on peduncle	0	5+	3	0

posterior spines on gnathopod 2 besides the spine defining the palm, more weakly fimbriate peduncles of uropods 1–2, more strongly shortened inner ramus of uropods 1 or 2, the presence of pigmentation, long setae on the peduncle of uropod 3 or distinct spines on uropod 3 (two kinds of spine-setae, thick and thin).

Now that our species has come to light, we detect that the following attributes and characters of several species of *Siphonoecetes* must be better described so that new distinctions can be attributed to those species: the flattened and bifid aspect of the mandibular palp; diversity in male and female gnathopods; and spine counts both on the apices and margins of uropods 1–2.

Borneoecetes, new genus

Diagnosis.—Rostrum normally pointed. Coxae 3–4 with simple distal margin. Large gills present on coxae 3–6; oostegites present on coxae 2–5 in female. Gnathopod 1 simple; gnathopod 2 subchelate. Dactyls of pereopods 3–7 with accessory tooth. Urosomite 2 free. Telson free, but proximal margin hidden by urosomite 2. Uropod 1 biramous, inner ramus reaching three-fourths along outer, both rami of similar structure, with strong apical spine(s); uropod 2 uniramous. Uropod 3 with distomedially expanded peduncle and setiferous ramus.

Type-species.—*Borneoecetes wongi*, new species.

Etymology.—Named for Borneo, the type-locality.

Relationship.—Dr. Jean Just has given us extensive help from his recent experience with undescribed species in the vicinity of this taxon. At first we considered this species to be *Bubocorophium tanabensis* (Harada, 1971), but Dr. Just assures us that the shape of the mandibular palp, the uniarticulate palp of maxilla 1 and unfused urosomites make such identification impossible. The latter character makes impossible the assignment of our species to *Bubocorophium* Karaman (1981). The only other available genus with uniramous uropod 2 is *Rhinoecetes* Just (1983) but our species differs from that genus in the ordinary head lacking anterodorsal depression. Our species “more or less” lacks spines on article 1 of the flagellum on antenna 2 (it often has one seta thickened sufficiently to be called a spine) but we have decided to ignore the spine problem for the moment as spines can only be evaluated synoptically by a single observer looking at all known species or by rendering unequivocal diagrams to define spines.

Borneoecetes wongi, new species

Figs. 6–9

Diagnosis.—Size of adults about 2.00–2.75 mm. Body delicate, fragile, unpigmented in alcohol. Rostrum pointed, extending as far as ocular lobes; latter round-

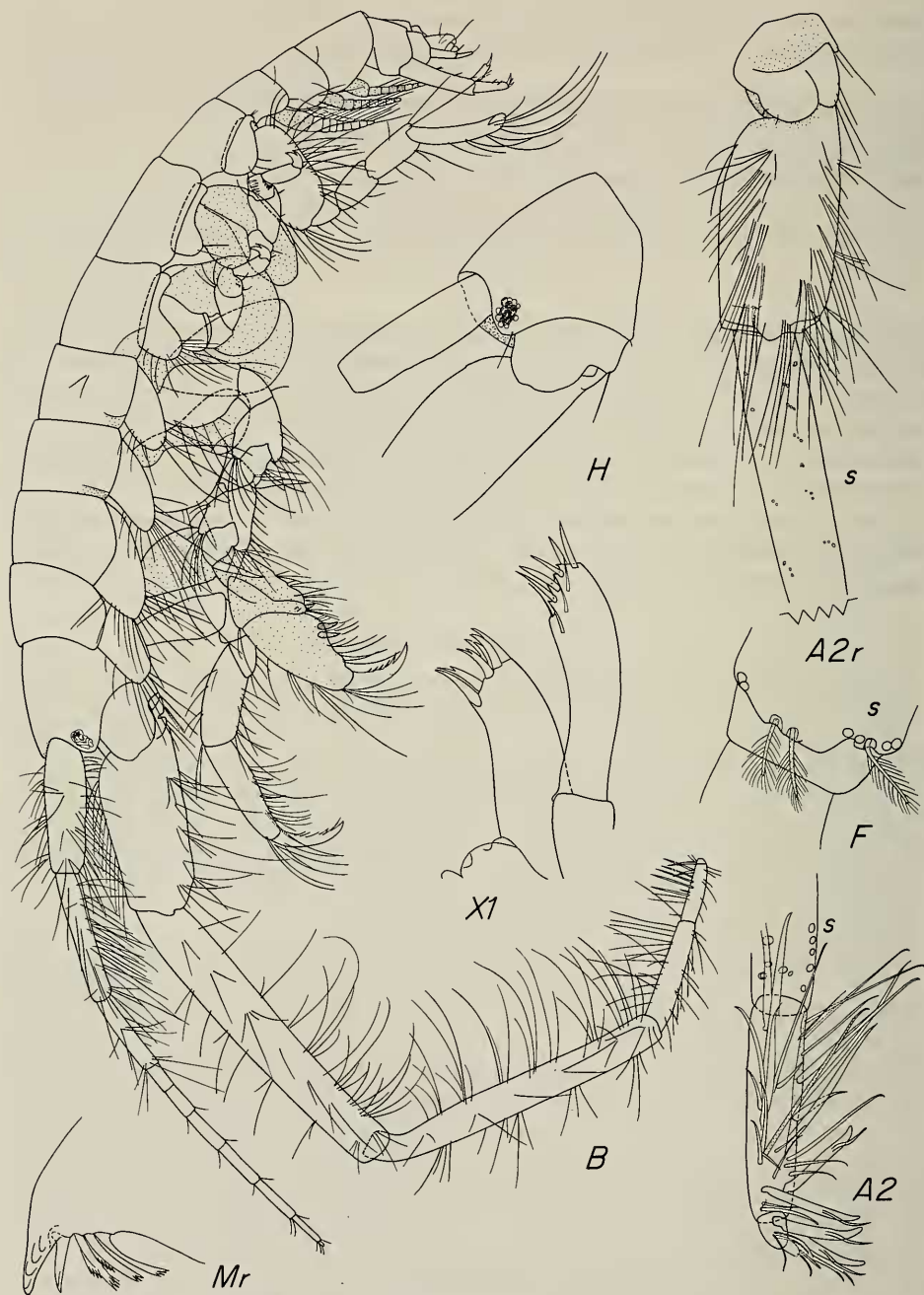


Fig. 6. *Borneoecetes wongi*, all figures holotype male "n."

ed. Eyes small. Antenna 1 barely exceeding apex of article 4 on antenna 2, flagellum with 6 well-developed articles tipped with tiny seventh. Article 5 of peduncle on antenna 2 about 90 percent as long as article 4, flagellum with 4 articles, article 1 lacking spines except for one apical element very slightly thickened and not

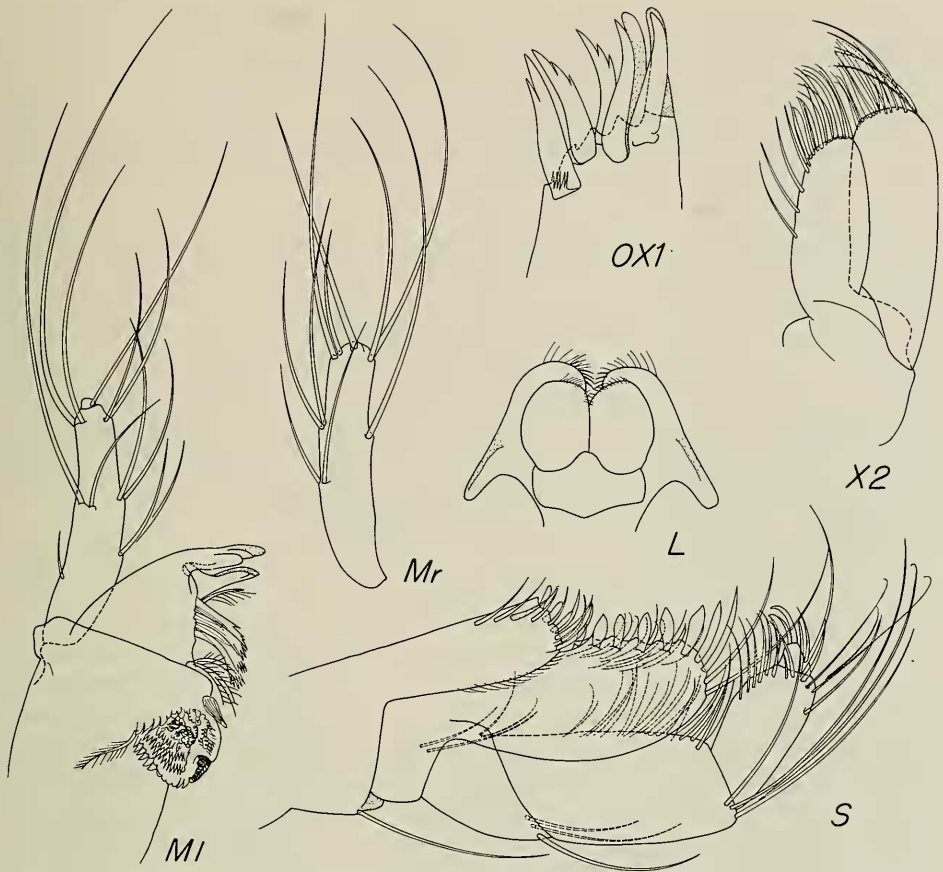


Fig. 7. *Borneoecetes wongi*, all figures holotype male "n."

capable of bending, article 2 of flagellum almost 60 percent as long as article 1, spinose, articles 3–4 vestigial. Coxa 1 scarcely broader than long, anteroventral corner blunt, all setae confined to moderate distance on margins. Gnathopod 1 with slender, unexpanded hand (article 6) bearing 2–3 posterior spines. Gnathopod 2 propodus (article 6) ovate, palm sloping, equal to half of posterior margin, no extra spines present other than 2 spines defining palm. Uropod 1 peduncle with 2+ dorsolateral setae and 4+ apicolateral setae, ventral lamella strongly serrate. Uropod 1 rami unequal in length and thickness, each with apical hollow, inner ramus shorter and thinner than outer, not swollen, bearing 1 apical spine; outer ramus with 2 apical spines, one subapical spine and 3 dorsolateral spines evenly distributed and not mingling with apical spines. Uropod 2 peduncle with 0–1 dorsal setae and 2–3 apicolateral setae, apicoventral lamella moderately fimbriate, inner ramus absent. Uropod 3 peduncle with 2–3 apical spine-setae shorter than peduncle, ramus with 3 long setae almost as long as peduncle; ramus tending to become fused to peduncle especially in adults.

Description and Notes on Illustrations.—Most of morphology shown in illustrations; description largely based on holotype male "n." Eyes weak, formed of several compacted elements with scattered brownish pigment. Lateral and medial

surfaces of peduncle on antenna 1 almost equally setose; accessory flagellum vestigial, composed of 2 penicillate setae attached side by side on apex of peduncular article 3. Lateral surfaces of peduncular articles on antenna 2 poorly setose but lacking spines, medial surface of article 4 in both sexes with proximal to distal spine formula of 0, formula on article 3 in both sexes = 0-1. Female antenna 2 similar to male, flagellum with 4 articles, first longest, each following article much shorter than previous.

Epistome unproduced; upper lip articulated to epistome, subcircular, weakly truncate or slightly excavate below. Mandibular incisors toothed, right and left laciniae mobiles with 2 and 3 teeth respectively, right and left rakers = 3 and 4, each molar with 2 flakes and seta, palp composed of one long article tapered apically when properly flattened, bearing second tiny article tipped with seta. Labium as shown. Inner plate of maxilla 1 evanescent, outer plate with 7 spines, medial triad bifid or trifid, palp ordinary in shape but 1-articulate. Inner plate of maxilla 2 with 4 medial setae, no facials. Inner plate of maxilliped with 3 main stubby apical spines, outer plate with sharp medial chisel spines, palp article 4 small, stubby, bearing long nail and accessory nail.

Coxae following coxa 2 all disjunct. Setae on coxae 1-2 in 2 tiers, in other words, anterior and ventral edges with lateral and medial rows. Propodus (article 6) of gnathopod 1 in both sexes with almost straight posterior margin bearing 2-3 (3 in female) spines. Gnathopod 2 without strong sexual distinction, lobe of carpus (article 5) with one stout spine, palm weak and defined by 2 stout spines, palm near hinge with rudimentary cusp. Pereopods 3-4 alike, article 4 enveloping reduced article 5, article 6 attached to oblique apical margin of article 5, dactyl simple (bearing subapical meatus). Pereopods 5-6 subsimilar, small, article 5 with facial stridulating (or non-skid) surface, pereopod 7 elongate, lacking rough surfaces, dactyls of pereopods 5-7 with outer cusp. Large gills present on coxae 3-6 in male, but in female 3-4 scarcely reduced and gill 5 not reduced, thin oostegites present on coxae 2-5, formula of anterior setae = 5-2-2-2, distal and posterior setae together = 7-5-3-3 (on female "p").

Epimera 1-3 each with midposterior seta in notch, epimeron 1 with 3 large ventral setae and one posteroventral setule, epimeron 2 with 5 large ventral setae and 1 smaller posteroventral seta, epimeron 3 with 2 small ventral setae. Pleopods all subsimilar, each peduncle with medial lobe bearing 2 coupling hooks, formulae of lateral peduncular setae on pleopods 1-3 = 3-2-3, ventral setae = 3-2-2, outer rami all with 7 articles, inner with 6, outer setae on outer rami = 8-9-8.

Urosomites 2 and 3 not fused together dorsally but urosomite 3 lacking dorsal representation, urosome otherwise naked except for dorsolateral seta on urosomite 2. Peduncle of uropod 1 with 3 dorsolateral setae and 3 apicolateral setae (female with 5 and 5). Outer ramus of uropod 1 with 2 dorsal and 2 apical spines (female with 3 and 3). Inner ramus of uropod 1 smaller than outer ramus, dorsal minor spination of rami variable from side to side. Uropod 2 of male with 2 apicolateral peduncular setae, female with 3 apicolateral and one middorsal setae as shown. Peduncle of uropod 3 with one apical seta (3 in female), ramus with 2 (3 in female). Ramus of uropod 3 frequently asymmetrical side to side, smaller or larger, on occasion partially fused to peduncle as shown. Plaques on telson with small corneal hooks (not well enough resolved in oil-immersion microscopy to illustrate).

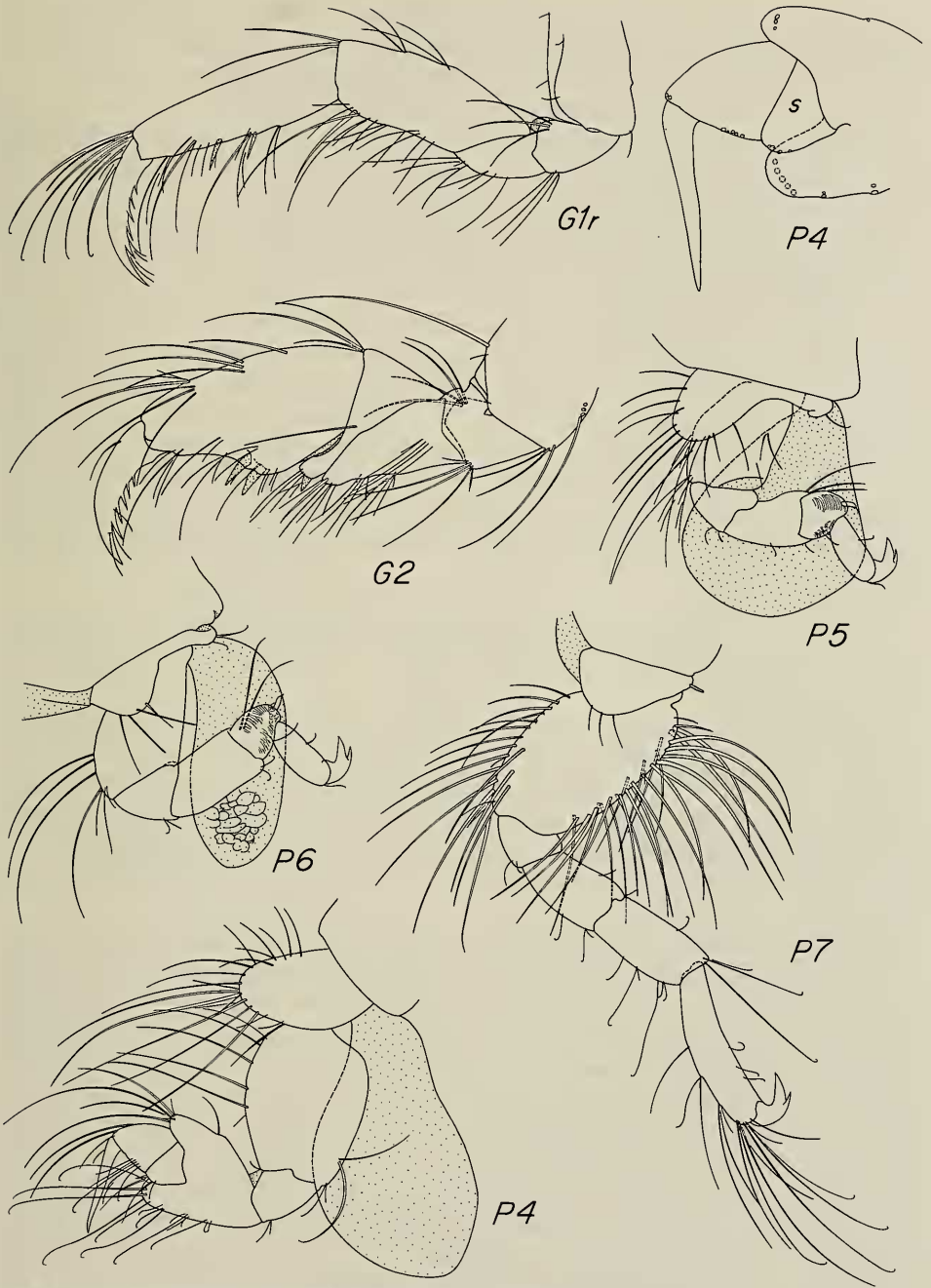


Fig. 8. *Borneoecetes wongi*, all figures holotype male "n."

Female "v."—Represents main described female referred to in male description above. Rostrum projecting slightly in front of eyes. Setae of coxae 1 = 33, of 2 = 33, of 3 = 29, of 4 = 17, of 5, 13 + 3 (anterior and posterior lobes), of 6 = 6 + 3, of 7 = 4 + 1. Main setae of epimeron 1 = 5, epimeron 2 = 7.

Female "p."—Main large setae on epimeron 1 = 3, epimeron 2 = 7. Setae of uropod 1 peduncle, dorsolateral = 6, apicolateral = 5; peduncle of uropod 2 = 3 and 1 proximal; peduncle of uropod 3 = 2, ramus = 2.

Juvenile "i," 0.98 mm.—Flagellum of antenna 1 with 3 large articles tipped with tiny fourth. Antenna 2 as stout as adult, first 2 articles equal in length as in Japanese adults of *B. tanabensis*. Example of weaker setation than in adults, coxae 1–7 = 6–9–4–3–2–1–0, with anterior and posterior divisions on coxae 5 and 6 being 1–1 and 0–1. Propodus (article 6) of gnathopod 1 with only 1 main posterior spine, gnathopod 2 with only 1 palmar defining spine. Epimera 1–3 all with large posterior crotch seta, main ventral setae = 1–2–0. Peduncle of uropod 1 with only 2 apicolateral setae, outer ramus with 3 apical spines, none dorsally. Only spine on uropod 2 on apex of ramus. See illustrations of uropod 3 and telson apex, peduncle of uropod 3 with one apicomедial seta, ramus with one long seta, vestige of inner ramus appearing through chitin of peduncle. Each apical plaque of telson with 3 weak hooks.

Holotype.—USNM No. 195136, male "n" 2.03 mm, illustrated.

Type-locality.—Borneo, north coast of Brunei, off Sungei Buloh, 4°N, 113°57'E, 2–3 m, 1983, temperature 31.5°C, salinity 32‰, Wong Tat Meng Sample MCF 40 (71 specimens).

Material.—Type-locality, male "n" 2.03 mm (main illustrations), female "p" 2.59 mm, ?male "q" 2.55 mm, male "r" 2.14 mm, male "s" 1.47 mm, ?sex "t" 1.61 mm, female "v" 2.71 mm (illustrated), juvenile "i" 0.98 mm (illustrated), juvenile "z" 0.90 mm. Also 15 specimens from MCD 53 and 9 specimens from MCD 47, both from same area in depths of 3–4 m and 2–3 m respectively.

Etymology.—The species is named for Dr. Wong Tat Meng of Universiti Sains Malaysia.

Remarks.—We immediately noticed the partially fused ramus of uropod 3 in our material and Harada (1971) shows the ramus completely fused to the peduncle in *Bubocorophium tanabensis*. Dr. Just informs us that this occurs infrequently in populations of the many species of the group he has examined. This fusion of uropod 3 to the peduncle was confusing to Harada who therefore identified the segment of urosomite 3 as the peduncle and the remainder of the appendage as the ramus, whereas one can distinguish in Harada's figures the fused ramus and the medial peduncular protrusion armed with 2 setae. Hence, one must correct Harada's key to the species of *Siphonoecetes* so as to state that the medial protrusion on the peduncle of uropod 3 actually bears 2 setae; this is crucial to separating *B. tanabensis* from its neighbor, *S. conchicola* Gurjanova, from the Japan Sea, 5–12 m, associated with *Olivella* shells. That species is shown by Gurjanova to have about 5 peduncular setae and 7–8 ramal setae (one of which appears actually to be a stout spine). Harada's figures 8-5 and 8-6 show the peduncle with 1–3 medial and 1–4 ramal setae. Harada discusses the probability that Gurjanova's illustration of uropod 2 can be interpreted to show only one ramus, in which case *conchicola* indeed belongs to *Bubocorophium*.

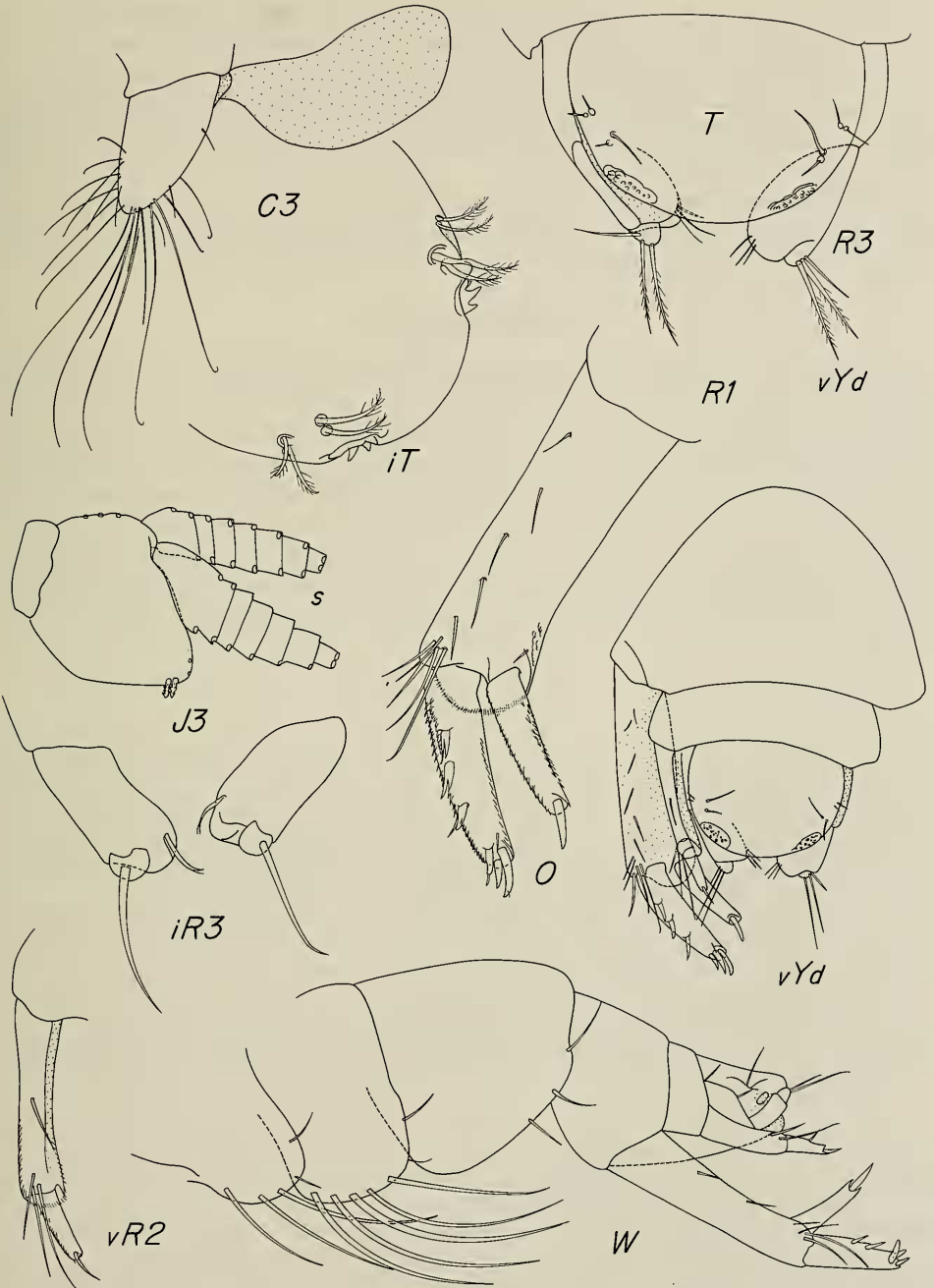


Fig. 9. *Borneoecetes wongi*, unattributed figures holotype male "n"; i = juvenile "i" 0.98 mm; v = female "v" 2.71 mm.

Harada noted that Barnard (1969) accepted *Siphonoecetes* as having one or two rami on uropod 2 (a condition Barnard had taken from his interpretation of *S. conchicola*). Karaman later established *Bubocorophium* to accommodate *tanabensis* and "maybe" *conchicola*. Just (1983) has continued the division of siphonoecetines in greater detail and verifies the validity of the characters used in our diagnosis of *Borneoecetes* above.

We find the palp of maxilla 1 to be uniaarticulate unlike any other siphonoecetine (Just has found a 2-articulate palp in 30 other species). Whether or not this has validity as a generic character must await Dr. Just's further studies.

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Literature Cited

- Barnard, J. L. 1969. The families and genera of marine gammaridean Amphipoda.—United States National Museum Bulletin 271:1–535, figs. 1–173.
- Chevreaux, E., and L. Fage. 1925. Amphipodes.—Faune de France 9:1–488, figs. 1–438.
- Gurjanova, E. 1938. Amphipoda, Gammaroidea of Siaukhu Bay and Sudzukhe Bay (Japan Sea).—Reports of the Japan Sea Hydrobiological Expedition of the Zoological Institute of the Academy of Sciences, USSR, in 1934 1:241–404, figs. 1–59.
- . 1951. *Bokoplavy morej SSSR i sopredel'nykh vod* (Amphipoda–Gammaroidea).—Akademiia Nauk SSSR, *Opredeliteli po Faune SSSR* 41:1–1029, figs. 1–705.
- Harada, E. 1971. A new amphipod of the genus *Siphonoecetes* from the shallow bottom of southern Japan, with reference to the diagnoses of the genus and its species.—Publications of the Seto Marine Biological Laboratory 18:355–378, figs. 1–11.
- Hirayama, A. 1984. Taxonomic studies on the shallow water gammaridean Amphipoda of West Kyushu, Japan II. Corophiidae.—Publications of the Seto Marine Biological Laboratory 29:1–92, figs. 1–100.
- Just, J. 1983. Siphonoecetinae subfam. n. (Crustacea, Amphipoda, Corophiidae) 1: Classification.—Steenstrupia 9(6):117–135, 12 figs.
- Karaman, G. S. 1981. Revision of some genera of family Corophiidae with description of three new genera.—*Poljoprivreda i Sumarstvo* 26:13–24.
- Myers, A. A., and D. McGrath. 1979. The British and Irish species of *Siphonoecetes* Krøyer (Amphipoda–Gammaroidea).—*Journal of Natural History* 13:211–220, figs. 1–16.
- Ruffo, S. 1959. Contributo [13] alla conoscenza degli Anfipodi del Mar Rosso.—*Sea Fisheries Research Station, Haifa, Bulletin* 20:1–36, figs. 1–6.
- Sars, G. O. 1895. Amphipoda.—An account of the Crustacea of Norway 1: i–viii, 1–711, plates 1–240 + 1–8 suppl. pls.
- Stebbing, T. R. R. 1910. Crustacea. Part V. Amphipoda. Scientific Results of the Trawling Expedition of H.M.C.S. "Thetis."—*Australian Museum, Memoir* 4, 2:565–658, pls. 47–60.
- Walker, A. O. 1904. Report on the Amphipoda collected by Professor Herdman, at Ceylon, in

1902.—Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar, Supplementary Report 17:229–300, plates 1–8.

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